Outdoor mold levels and pediatric asthma in San Juan, Puerto Rico

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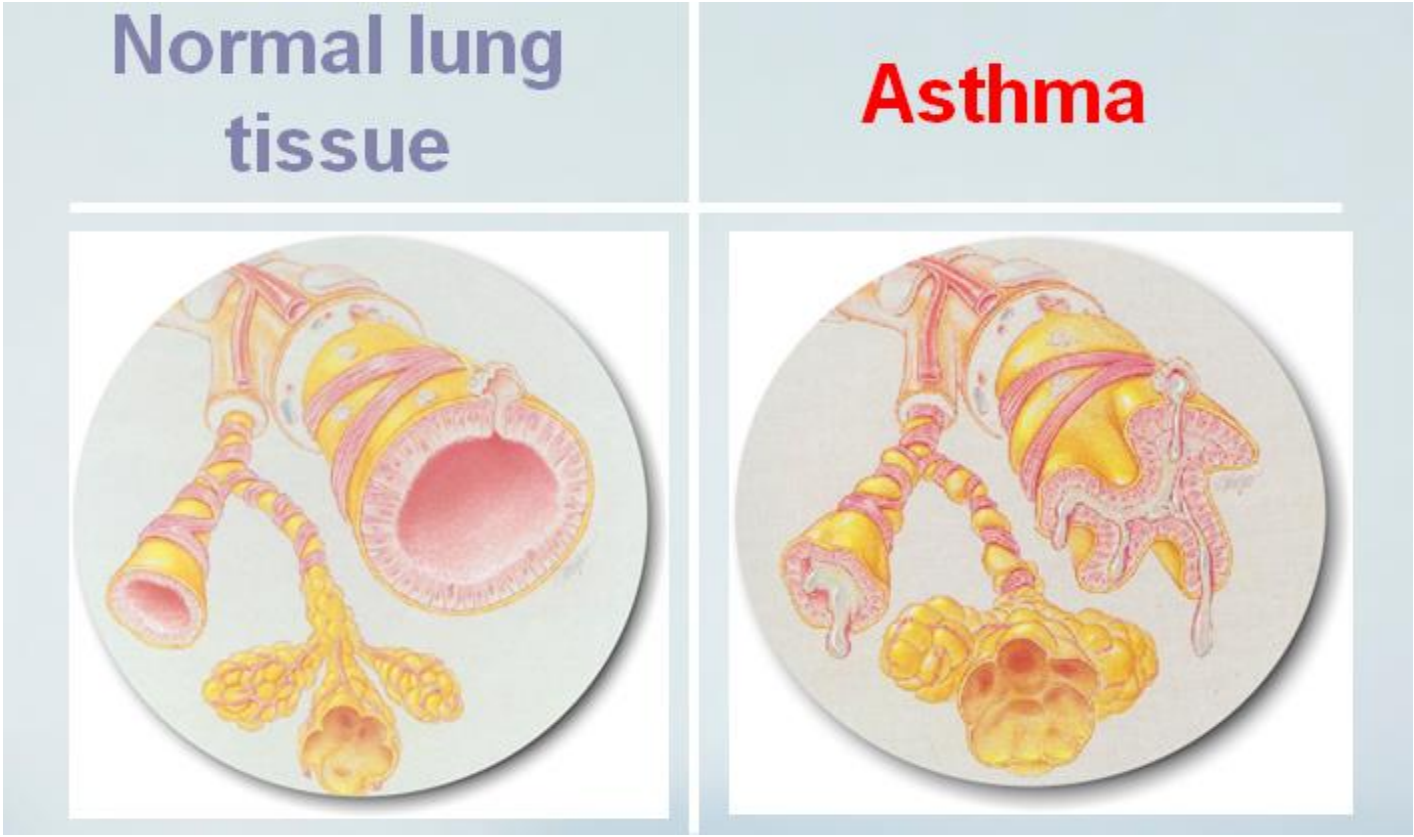
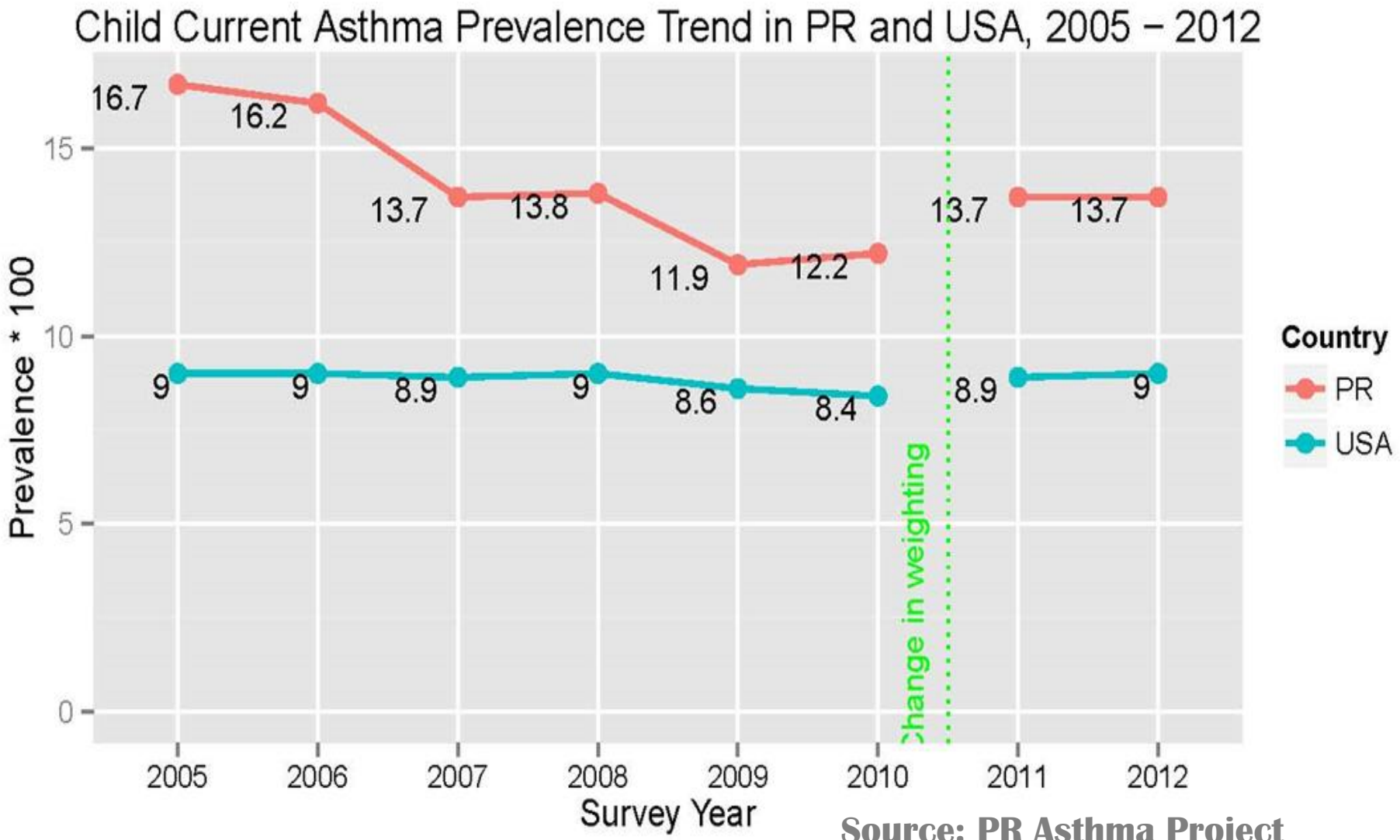
Asthma: Multifaceted Disease



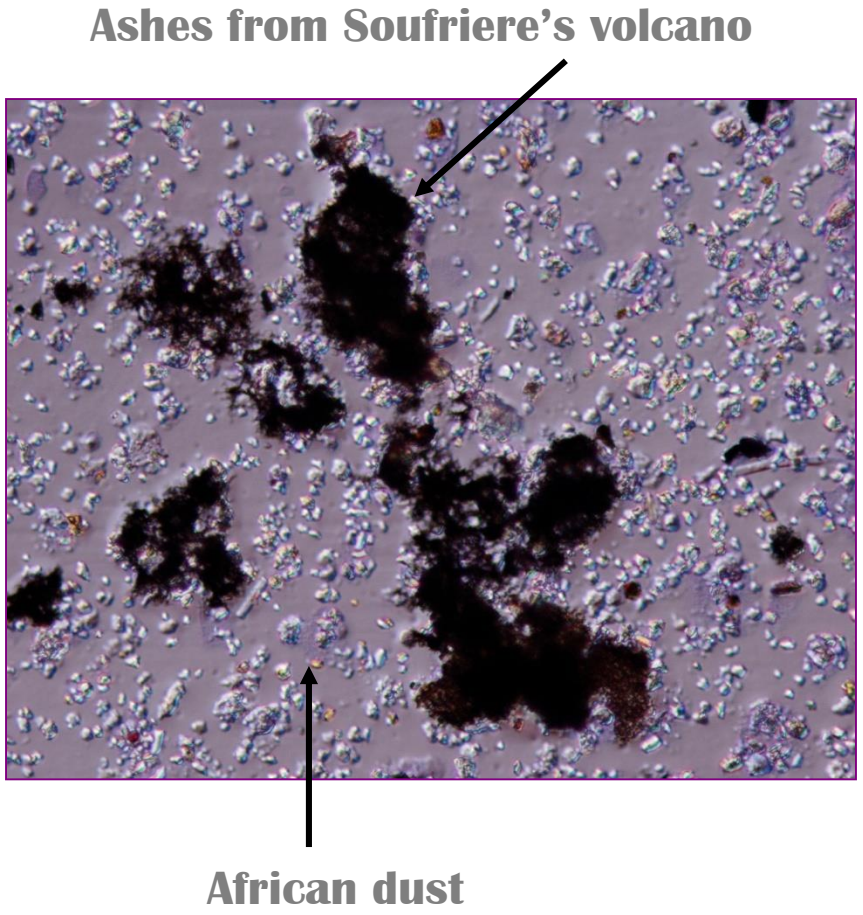
Child current asthma prevalence trend in PR and USA 2005-2012



Source: PR Asthma Project

Justification for reporting outdoor aeroallergens in Puerto Rico

- Recurrent incursions of African dust and Soufriere volcanic ashes.
- Lack of a calendar of pollens and mold spores.
- Only a few aerobiological studies in the tropics.
- Not clear the role of outdoor molds in asthma and allergies.



San Juan AAAAI-NAB Station
Medical Sciences Campus, UPR

Certified by the National Allergy Bureau of the American Academy of Allergy Asthma and Immunology since 2005

Detection of outdoor levels of spores and pollens: Spore traps such as the Burkard air sampler

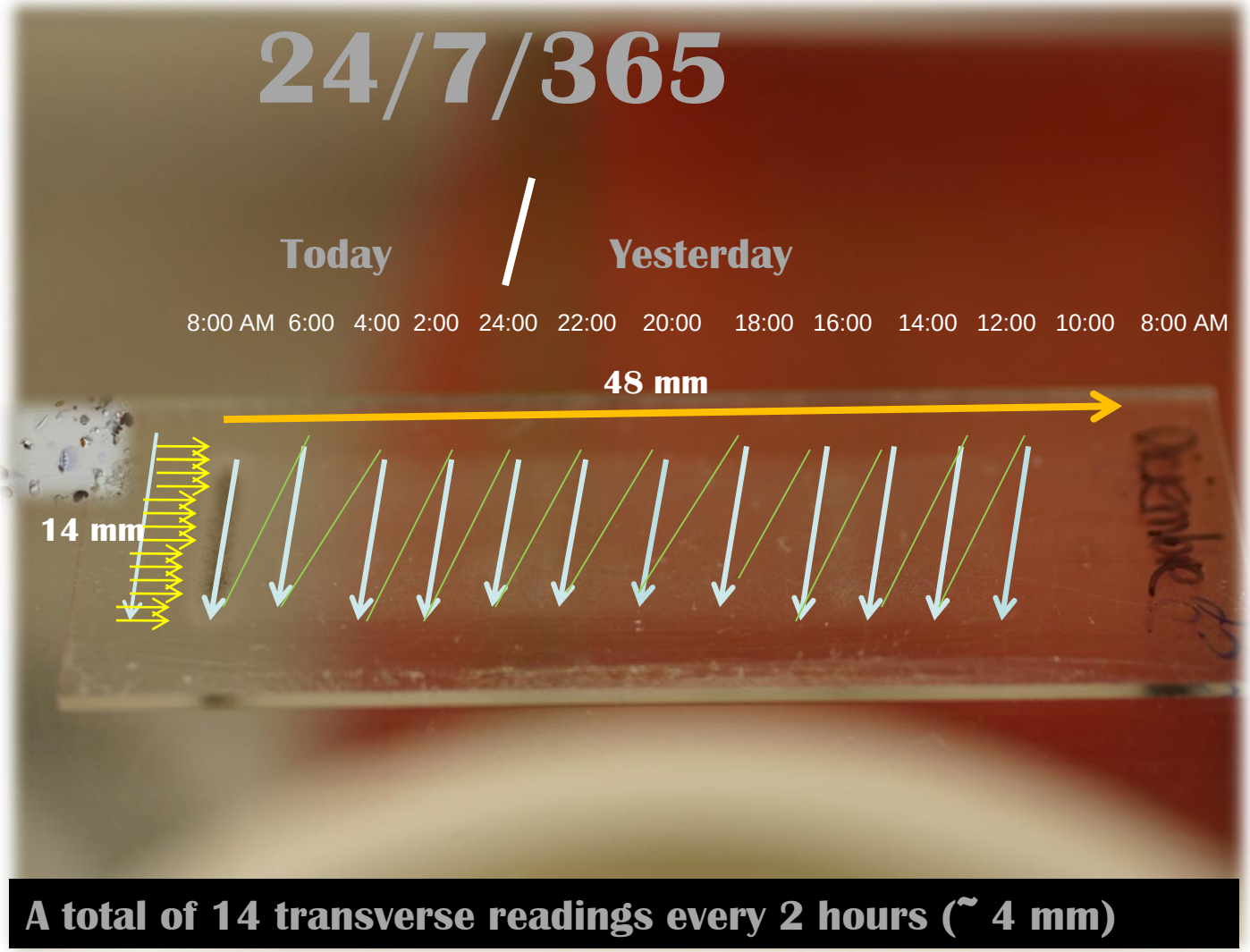
DEPOSITION OF POLLENS AND FUNGAL SPORES AEROSOLS

Burkard Air Sampler

- Wind-oriented Volumetric Spore Trap

Air flow: 10L/min (0.01m^3 of air/min)

Procedure for the enumeration of outdoor aeroallergens that impacted the glass slide



Reading of the slide at the microscope

Reading with the help of “Database Middleware Management System”

14 readings with the 100X objective every two hours. A total of 12 readings (a 2 hours intervals provide the daily levels of outdoor fungal spores or pollens/m^3

NAB: Pollen & Spore Levels - South Atlantic

Please select a city to view the Pollen and Mold Level for that location. Click here to return to the map of the United States.

- Asheville, NC
- Birmingham, AL
- Charleston, SC
- Gainesville, GA
- Greenville, SC
- Huntsville, AL
- Orlando, FL
- Oxford, AL
- San Juan, PR
- Sarasota, FL
- Savannah, GA
- Tampa, FL

National Allergy Bureau Pollen and Mold Report

Location: San Juan, PR **Date: August 03, 2011**

NAB Station: Medical Sciences Campus, U.P.R.

Station Notes: Presencia baja de cenizas y polvo de Africa. Low presence of ashes and African dust.

Top 3 Species:

All identified tree pollen not counted elsewhere (*Other Tree Pollen*)

ABSENT

No Weeds allergens noted today

ABSENT

No Grass allergens noted today

Top 3 Species:

Ascomycete/Ascospore (*Diatrypaceae*)

Basidiospores: includes Coprinus, Agrocybe, Agaricus, Inocybe, Laccaria,

Reading the Charts

The NAB pollen and mold spore levels were developed using the chart below. The concentrations in the chart (pollen or spores p
from all certified counting sites. The levels correspond to different ranges for each of the pollen categories and for fungal spores.
translated into levels based on the following:

- Low levels are concentrations that are less than the median or 50th percentile (i.e. half the counts were below the median.)
- Moderate levels are concentrations that fall between the 50th and 75th percentile
- High levels fall between the 75th and 99th percentile
- Very high levels are above the 99th percentile (99% of the counts are below this level)

Based on these definitions, we suggest the following ranges for low, moderate, high, and very high.

NAB SCALE

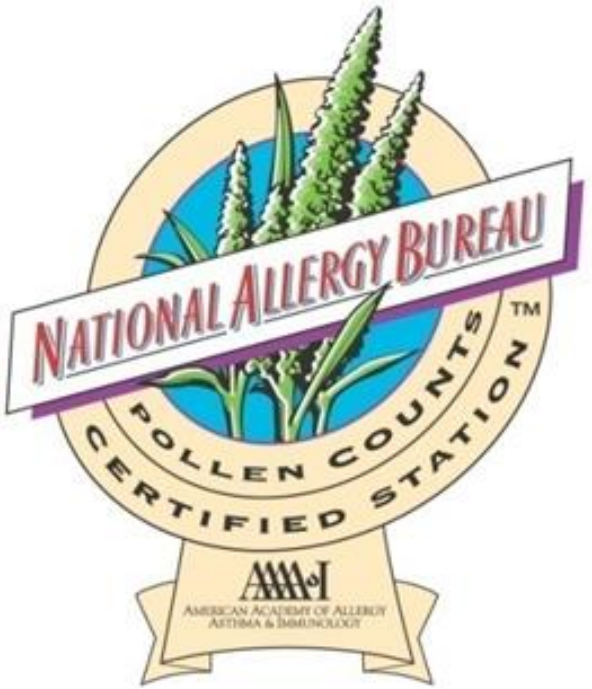
* MOLD		GRASS		TREE		WEED	
0 - 6499	Low	0 - 4	Low	0 - 14	Low	0 - 9	Low
6500 - 12999	Moderate	5 - 19	Moderate	15 - 89	Moderate	10 - 49	Moderate
13000 - 49999	High	20 - 199	High	90 - 1499	High	50 - 499	High
>50000	Very High	>200	Very High	>1500	Very High	>500	Very High

San Juan Station SCALE

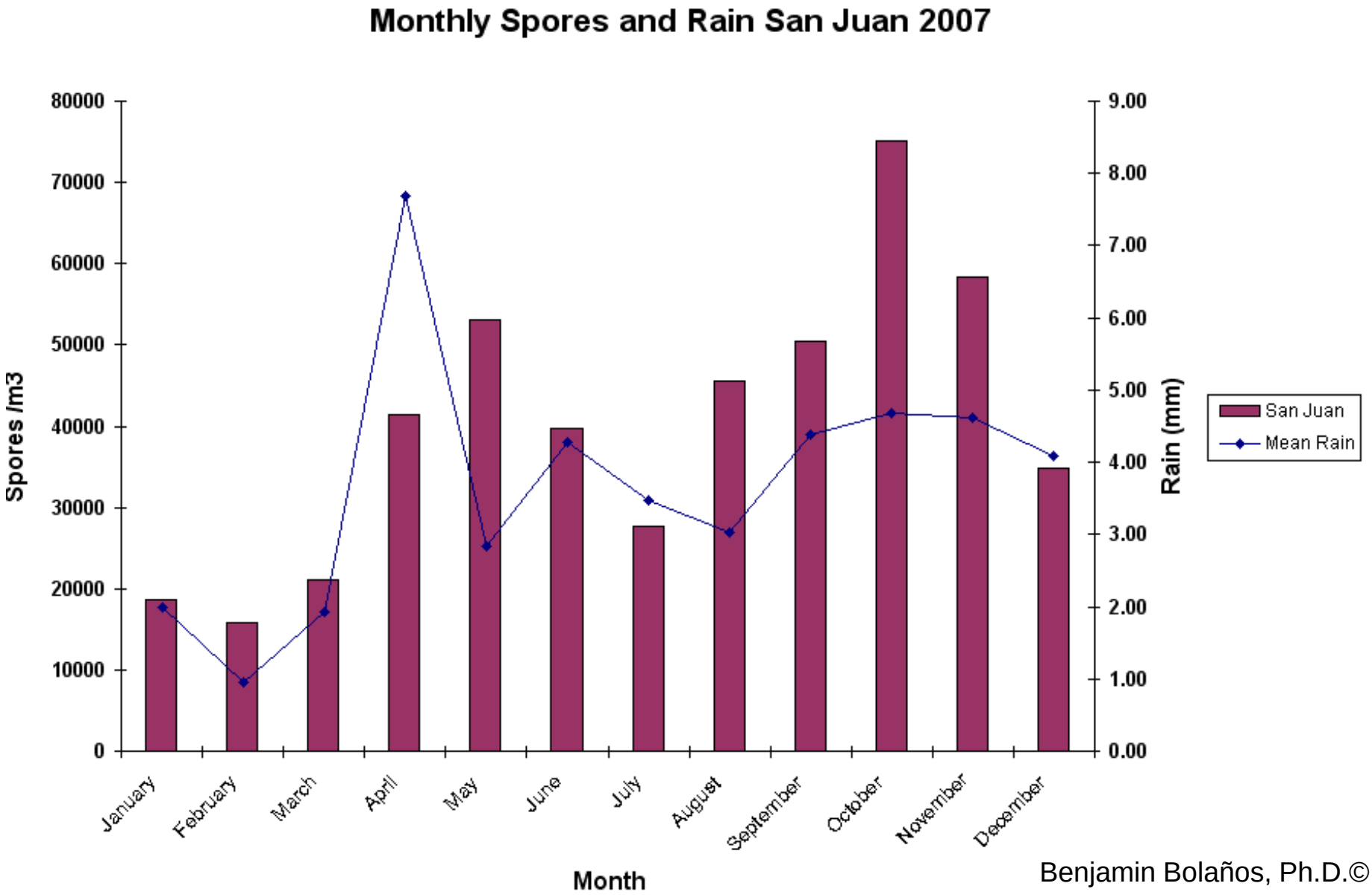
* MOLD		GRASS		TREE		WEED	
1 - 38999	Low	0 - 4	Low	1 - 113	Low	0 - 9	Low
39000 - 64999	Moderate	5 - 19	Moderate	114 - 228	Moderate	10 - 49	Moderate
65000 - 154999	High	20 - 199	High	229 - 1049	High	50 - 499	High
>155000	Very High	>200	Very High	>1050	Very High	>500	Very High

3X Fold!!

San Juan, Puerto Rico
Fungal Spore Calendar



Role of precipitation on the levels of outdoor spores in San Juan,PR



Outdoor fungal levels

USA and Europe

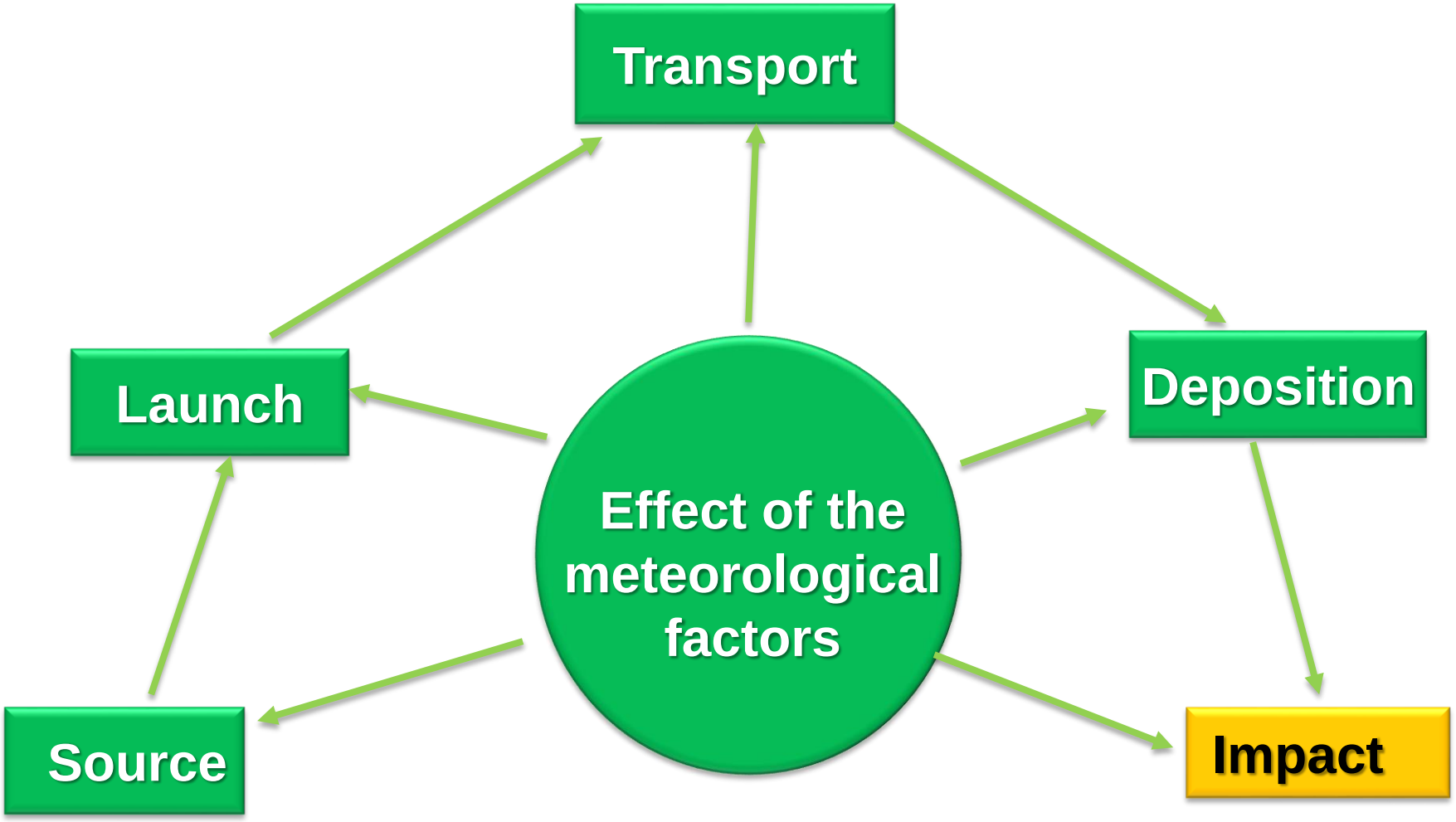
- Low to moderate levels (red alert levels >50,000 spores/m^3)
- Less frequent
- No season mostly in the fall
- Types of spores (mitogenic fungi)
  - *Alternaria* sp
  - *Cladosporium* sp
  - *Aspergillus* sp

Puerto Rico (Tropical areas?)

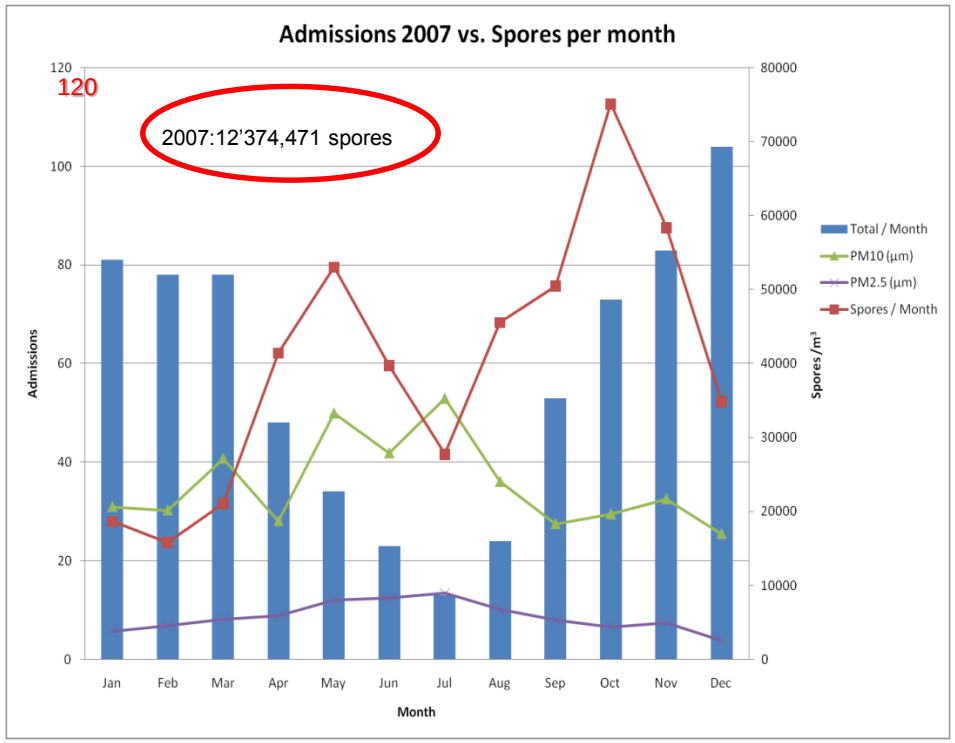
- High to very high levels (red alert levels 155,000 spores/m^3)
  - Circadian rhythms
- Present all year long very common
- Seasons
  - Long and very high levels (Sept-Nov)
  - Short and high levels (April and May)
- Predominant spores
  - Basidiospores*
  - Ascospores*

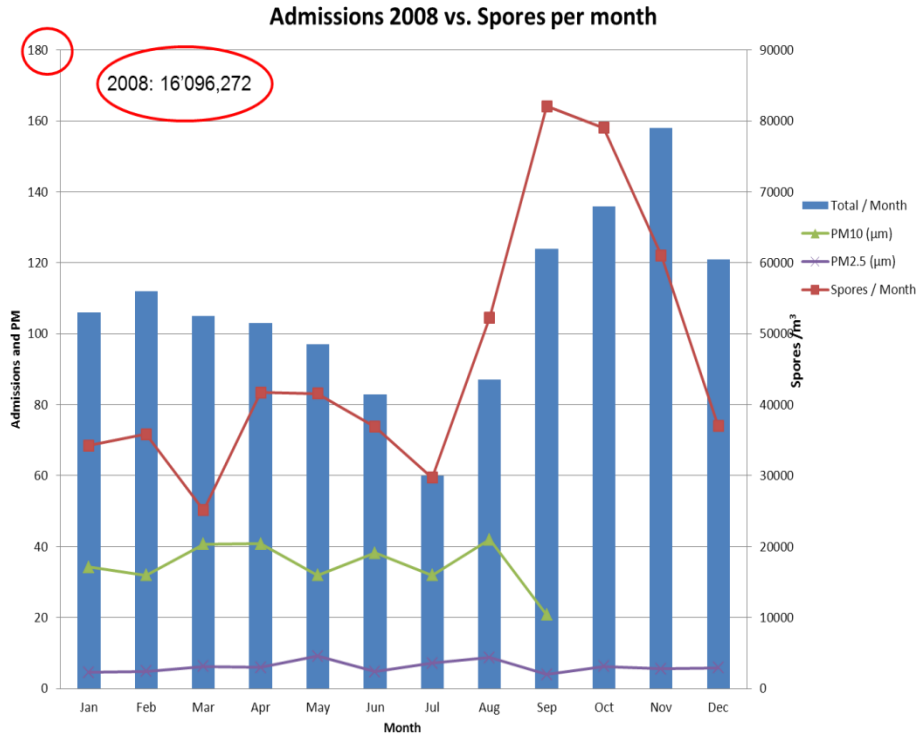
* No commercially available diagnostic reagents

Aerobiological Pathway



Association of asthma related admissions at San Jorge Children's Hospitals and fungal spores levels





Benjamin Bolaños, Ph.D.©

Conclusions: Asthma & Outdoor Fungal Spores

- Increase in the asthma related hospital admissions was observed in hospitals in San Juan during the high season of fungal spore levels (Sept-Nov)

- Therefore part of the asthma in PR, is allergic and seasonal coinciding with red alert levels of spores during the rainy months

- Future clinical studies will confirm the clinical relevance of the fungal spores in the asthma and allergic rhinitis

Summary

- **"If a high proportion of individual are genetically predisposed to asthma, unique environmental factors unique to PR (*such as the very high levels of outdoor basidiospores and ascospores*) could have an additive effect resulting in a higher incidence of (*seasonal*) asthma".**

Loyo Berrios et al J. Asthma 2006

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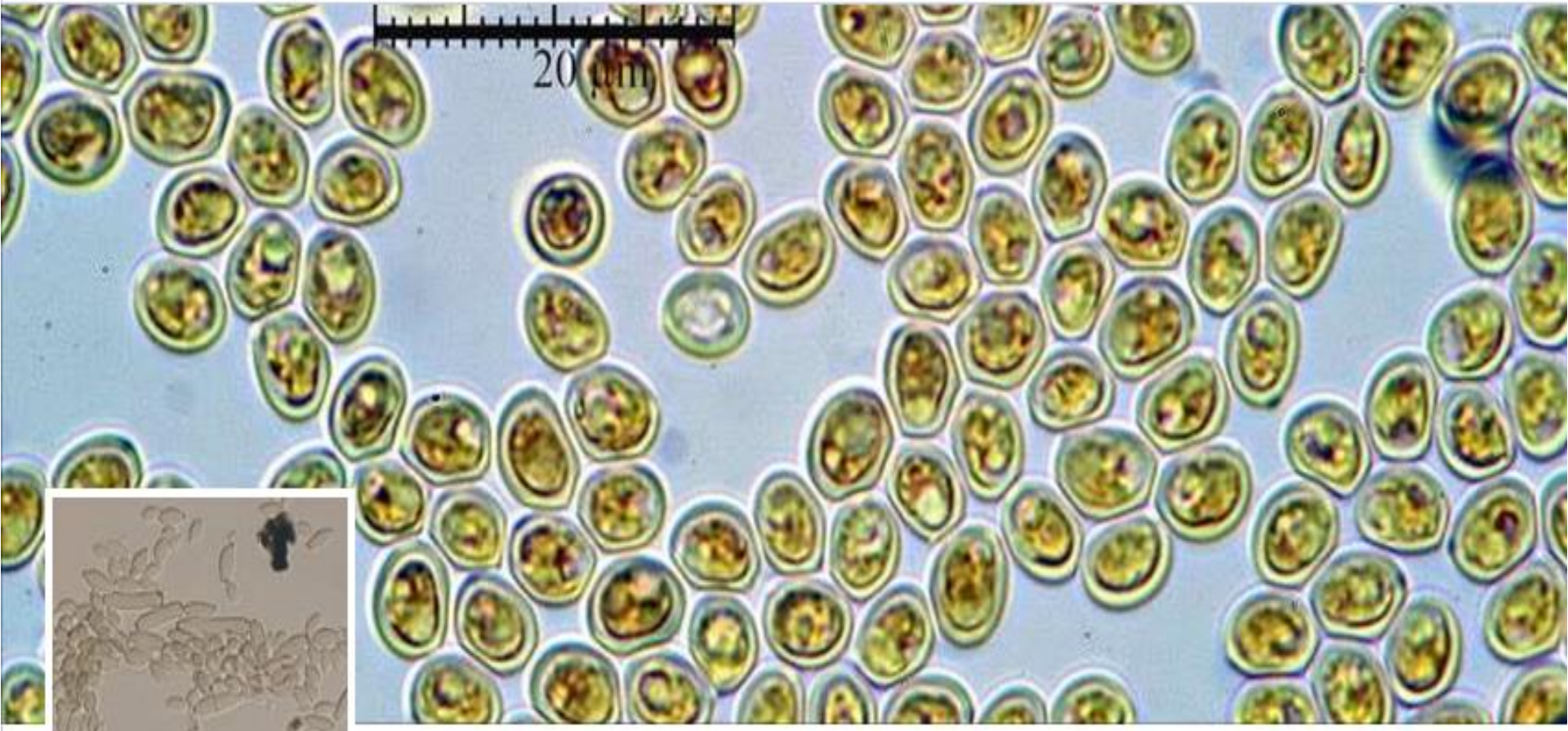

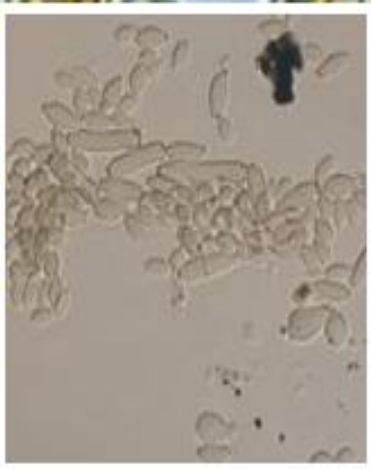

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ON THE IMPACT OF OUTDOOR ALLERGENS AS TRIGGERS OF ASTHMA IN PUERTO RICO

ASTHMA

Ashma is a disease of the lungs where the airways are closed or narrowed causing breathing difficulties. According to the Center for Disease Control (CDC) 22.4% of Puerto Ricans suffer from asthma and that percent increases to 25.3% in children between ages of 5-14.

Asthma Symptoms

The most common symptom of asthma is the whistle or hiss that occurs when you breathe. Other symptoms include:

- Shortness of breath
- Tight chest or chest pain
- Chronic cough
- Difficulty sleeping due to cough or whistle

Asthma attacks, in the case of allergic asthma, are commonly caused by pollen

about the pollen and spores levels from certified stations nationwide. We established the San Juan Station, located in the Department of Microbiology of the Medical Sciences Campus (RCM, by its Spanish acronym) of the University of Puerto Rico (UPR), in May 2005, and since then we report the levels of pollen and spores at a frequency 24/7. For daily information, access the following link: www.aaaai.org/nab.

EFFECTS OF CLIMATE AND LOCATION

The relationship between the levels of pollen and spores, and the symptoms they produce can be complex. The symptoms may be affected by recent contact with other allergens, amount of exposure to fungal spores and sensitivity to pollen and spores.

Allergy symptoms are often more severe in rainy days because the spores